

Amendments to the Claims

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1-11 (Canceled)

Claim 12 (Currently Amended): A method of manufacturing a waveguide type optical element as claimed in claim ~~22~~ ⁸ ~~[[9]]~~, wherein the impurity is Zinc.

Claim ~~13~~ ² (Currently Amended): A method of manufacturing a waveguide type optical element as claimed in claim ~~20~~ ¹ ~~[[9]]~~, wherein ~~in a case of~~ for oscillation with long wavelengths, the wavelength, said compound semiconductor layer~~[[,]] said undoped compound semiconductor layer, and said compound semiconductor substrate and the clad layer~~ are formed of InP.

Claim ~~14~~ ³ (Currently Amended): A method of manufacturing a waveguide type optical element as claimed in claim ~~20~~ ¹ ~~[[9]]~~, wherein ~~in a case of~~ for oscillation with short wavelengths, the wavelength, said compound semiconductor layer~~[[,]] said undoped compound semiconductor layer, and said compound semiconductor substrate and the clad layer~~ are formed of GaAs.

Claim 15 (Canceled)

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Claim ~~16~~ (Currently Amended): A method of manufacturing a waveguide type optical element as claimed in claim ~~20~~ ¹ ~~[[9]]~~, wherein an ~~InGaAsP~~ ¹ ~~layer~~ insulation film mask is grown on ~~said undoped~~ the undoped compound semiconductor layer as an etching stop layer.

⁵
Claim ~~17~~ (Currently Amended): A method of manufacturing a waveguide type optical element as claimed in claim ~~20~~ ¹ ~~[[9]]~~, wherein an insulation layer is formed at the third areas on ~~[[said]]~~ the light absorption layer ~~at said side of said ridge part where the clad layer has been removed.~~

⁶
Claim ~~18~~ (Currently Amended): method of manufacturing a waveguide type optical element as claimed in claim ~~20~~ ¹ ~~[[9]]~~, ~~wherein said compound semiconductor layer functions as a clad layer and~~ further comprising forming a contact layer ~~is formed on~~ [[said]] the clad layer.

¹⁰
Claim ~~19~~ (Currently Amended): A method of manufacturing an integrated optical waveguide type element integrating the ~~[[said]]~~ waveguide type optical element as claimed in any of claims 9 to 18 12-14, 16-19 and 21-24 into an optical amplifier or an

optical modulator.

1
Claim ~~20~~ (New): A method of manufacturing a waveguide type optical element,
comprising:

forming a light absorption layer on a compound semiconductor layer;

forming an undoped compound semiconductor layer on the light absorption layer, wherein the undoped compound semiconductor layer includes a first area, second areas located at both sides of the first area, third areas next to the second areas and fourth areas next to the third areas;

removing the undoped compound semiconductor layer in the first area to expose a part of the light absorption layer;

forming a clad layer on the exposed light absorption layer, and on the undoped compound semiconductor layer in the second, third and fourth areas;

removing the clad layer located on the undoped compound semiconductor layer in the third areas, and the undoped compound semiconductor layer in the third areas;

forming an insulating layer on the clad layer; and

forming an electrode on the insulating layer.

7
Claim ~~21~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ~~20~~, wherein said removing the clad layer forms a ridge portion of the

clad layer shaped as an inverted mesa, the ridge portion being above the light absorption layer at the first area and above the undoped compound semiconductor layer at the second areas.

⁸
Claim ~~22~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ~~20~~, wherein said forming a clad layer comprises adding an impurity to the clad layer as the clad layer is formed, whereby the impurity diffuses to the light absorption layer at the first area.

⁹
Claim ~~23~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ~~22~~, wherein said forming the clad layer comprises a metal phase epitaxy method.

¹¹
Claim ~~24~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ~~17~~, wherein the insulation layer is a polyimide.

¹³
Claim ~~25~~ (New): A method of manufacturing a waveguide type optical element

comprising:

forming a light absorption layer on a compound semiconductor layer;

forming an undoped compound semiconductor layer on the light absorption layer;

forming a window in the undoped compound semiconductor layer to expose the light absorption layer;

forming a clad layer on the undoped compound semiconductor layer and on the exposed light absorption layer in the window, an impurity within the clad layer diffusing through the window into the light absorption layer beneath the window;

selectively removing the clad layer so that an inverted mesa shaped ridge portion of the clad layer remains above the window;

forming an insulating layer over the clad layer after said selectively removing;
and

forming an electrode on the insulating layer.

¹⁴
Claim ~~26~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ~~25~~, wherein said forming a clad layer comprises a metal phase epitaxy

¹³

method.

¹⁵
~~Claim 27~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ¹³~~25~~, wherein for oscillation with long wavelengths, the compound semiconductor layer and the clad layer are formed of InP.

¹⁶
~~Claim 28~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ¹³~~25~~, wherein for oscillation with short wavelengths, the compound semiconductor layer and the clad layer are formed of GaAs.

¹⁷
~~Claim 29~~ (New): A method of manufacturing a waveguide type optical element as claimed in claim ¹³~~25~~, wherein the impurity is Zinc.